In 2004, the top 10 private employers in Lincoln County were identified as the following:

- Genesis Inc.
- Harlow's School Bus Service
- Libby Care Center
- McDonalds (Libby)
- Mountain View Manor
- Owens & Hurst Lumber
- Plum Creek Timber
- Rosauer's Supermarkets
- St John's Lutheran Hospital
- Stein's IGA

Of the above mentioned employers, all but Plum Creek Timber are located outside the Hwy 567 study area, i.e., the one company that owns land in the study area is Plum Creek Timber Company. This company maintains a logging business with an office located in the City of Libby and uses Hwy 567 to access their property and logging areas along the study corridor.

The City of Libby has slightly different trends in population, employment and number of households than Lincoln County trends. The 2006 census lists a population of 2,662, down from the population in 1973 of 3,205. Projections for the year 2030 for cities are not available.[7] The year 2000 statistics list 1,061 employed and 601 single-family owner-occupied homes within the City of Libby.[8]

4.3 Development

Lincoln County does not have land use planning or zoning in the Hwy 567 area. The County allows residential developments, which are required to have a minimum of one acre and septic approval. Developments are subject to State regulations regarding water availability and septic tank suitability. According to Lincoln County, a large scale public waste water handling system or public water system is not proposed or expected in the near future for the Pipe Creek area. Therefore, future residential developments would continue to be large lots with septic tanks and private water systems. With the majority of the private land holdings in the corridor (except Plum Creek) having been developed or in the process of being developed, additional residential developments is limited.

Some residential development is possible mostly on land controlled by Plum Creek Timber Company, estimated to own approximately 12 percent of the land within a 5-mile radius of the corridor. According to Lincoln County, the Timber Company has recently expressed interest in subdividing some of their property into residential lots and plans to sell these lots to individual owners.

The County is currently evaluating the planning and zoning regulations and will decide sometime in 2008 the next steps for a "Growth Policy" for the County. According to the County, this policy will identify areas of planned future growth. In areas where services are limited the amount of expected growth would be minimal.

4.4 U.S. Forest Service Land

The U.S. Forest Service is responsible for the public lands planning and administration in the study area. Recreational facilities and forest management are subject to Forest Service regulations. The Kootenai National Forest is currently revising the Forest Management Plan. The Forest Management Plan determines the allowable uses on Forest Service owned property and guides the Forest Service's future decisions with respect to allowable uses, habitat conservation, recreation, and economic use of the forest resources.

The draft land management plan identifies the Pipe Creek area as General Forest Use. The Turner Ski area is located on FS lands, and operated by KWS. This land is owned by the U.S. Forest Service and managed as a

[7] http://ceic.commerce.state.mt.us/PL2000_place.asp
[8] http://factfinder.census.gov/home/saff/main.html?_lang=en

Primary Recreation Area. An area of the forest located to the east of Hwy 567 is planned for winter motorized snowmobile use.

The U.S. Forest Service has identified certain habitat and wildlife that warrant protection. This includes the Bull Trout, Canada lynx, Gray wolf, and Grizzly Bear and other sensitive or endangered species. Directly north of the study area, is the designated Cabinet Yaak Grizzly Bear Recover Zone. The study area is not located in the Grizzly Bear Recovery Zone but is located in the Grizzly Bear Distribution Area. The U.S. Fish Wildlife Service, the U.S. Forest Service and other agencies originally proposed the Cabinet Yaak Grizzly Bear Recovery Zone when Grizzly Bears were first listed as a threatened species. This zone is intended to facilitate the recovery of Grizzly Bears. Land management policies in the recovery zone are required to fully comply with the recovery of Grizzly Bears. The Grizzly Bear distribution area is also considered occupied bear habitat. For further discussion regarding implications of the Cabinet Yaak Grizzly Bear Recovery Zone and distribution area, refer to Section 4.10.1 Grizzly Bear.

4.5 Recreation

4.5.1 Existing Recreational Facilities

The U.S. Forest Service has a number of recreational facilities in the Pipe Creek area. During the summer months, a number of facilities provide opportunities for hiking, biking, fishing, equestrian use, camping, and hunting while the winter months allow for skiing at Turner Mountain, snowmobiling, and cross country skiing. The existing recreational facilities that can be accessed by using Hwy 567 are identified in Table 11. These recreation facilities are also considered potential Section 4(f) resources. Many of the trails are illustrated on Sheet 3 in Volume II.

Table 11 - Existing Recreational Facilities and Potential Section 4(f) Resources

Type	Name	Use	Season
Trails	Flat Iron Summit Trail	Cross Country Skiing	Winter
	Rainbow Ridge Trail	Cross Country Skiing	Winter
	East Fork Pipe Creek Loop	Snowmobile	Winter
	Quartz Creek Trail	Snowmobile	Winter
	Timberlane Trail	Cross Country Skiing	Winter
	Flat Iron Mountain Trail	Hiking, Equestrian, Biking	Spring/Summer/Fall
	Purcell Trail #7	Hiking, Equestrian, Biking	Spring/Summer/Fall
	Upper Pipe Trail #225	Hiking, Equestrian, Biking	Spring/Summer/Fall
	Schafer Creek Trail	Hiking, Equestrian, Biking	Spring/Summer/Fall
	Noisy Creek Trail	Hiking, Equestrian, Biking	Spring/Summer/Fall
Camping	Loon Lake Campground	Overnight Camping	Spring/Summer/Fall
	Timberlane Campground	Overnight Camping	Spring/Summer/Fall
	Big Creek Baldy Lookout	Overnight Camping	Spring/Summer/Fall
Ski Resort	Turner Mountain Resort	Downhill Skiing	Winter

4.5.2 Planned Recreational Facilities

At this time, the Forest Service and local government are not planning to expand the recreational facilities in the Pipe Creek area. The Turner Mountain ski area is not expected to expand. A resort community is not expected as part of the Turner Mountain ski area.

4.5.3 Special Events

Besides the normal events that might occur in the Kootenai National Forest, two local community biking events occur every summer – the STOKER bicycle tour of the Libby area; and the Turner Burner, which is a mountain biking race at Turner Mountain Ski Resort. The STOKER tour is a 98-mile, 350 participant tour which uses Pipe Creek road between Libby and Yaak. The Turner Burner is a local down hill mountain bike race.

4.6 Water Quality

Pipe Creek is not a 303(d) listed stream and is therefore in good water quality condition. Maintaining the water quality is a concern for Pipe Creek. The use of Magnesium Chloride for snow melting is unlikely to threaten the water quality in Pipe Creek. The Department of Environmental Quality (DEQ) recommends the use of Magnesium Chloride in place of sodium chloride or sand for winter road maintenance.[9] Sand is not currently used in winter maintence of Pipe Creek Road. Snow that is removed from the roadway should not be pushed or blown into the creek. The DEQ recommends adherence to MDT's Winter Maintenance Guidelines for the roadway. DEQ also recommends the following:

- Bridges should not allow sanding material drop through the deck and go directly into the creek
- Use curb and gutter on the bridges to channel runoff away from the bridge and creek. There is already curb and gutter on the existing Pipe Creek bridge (Timberlane Bridge – page 16), and the cost estimates include any repairs the existing curb and gutter require.
- Prevent the removal of an excessive number of trees adjacent to the stream which could potentially increase the water temperature in Pipe Creek
- Move Pipe Creek Road away from the creek to avoid roadway runoff and sediments entering the creek
- Use design features on the roadway that will capture runoff and sediment and prevent it from directly entering the creek
- Minimize riparian loss and stabilize side slopes
- Avoid disturbing existing stream banks

4.7 Utilities

Power along Pipe Creek Road is provided by the Flathead Electric Company. Power extends north from Libby to the Timberlane Campground at RP 7.4 which is located about a half mile past the Blue Mountain road intersection with Pipe Creek. The remaining section of the study area is not serviced with power. The power in the lower section is overhead and is mostly located on the north side of the road. The overhead power crosses Pipe Creek at the Timberlane Campground. The utilities that were identified in a survey are illustrated in Volume II.

Phone service along Pipe Creek road is provided by Frontier Communications. In the project area, phone service is located between Bobtail Cutoff road and the Blue Mountain Road at RP 6.9. Phone service does not extend further north along the corridor.

A public waste handling and public drinking water system is not located within the study area. Cabin developments are serviced by wells and septic tanks. Propane is used for heating.

4.8 Cultural Resources and Tribes

A cultural resources inventory and evaluation report was completed in January 2004 for a section of the Hwy 567/Pipe Creek study area. This is illustrated on Sheet 3 in Volume II. The evaluation was completed as part of a previous NEPA project that considered reconstructing a section of Hwy 567 between RP 6.1 (Bobtail Cutoff Road) to RP 14.1 (Loon Lake Road). The cultural resource report identified the environmental and cultural setting of Pipe Creek and inventoried twelve historical and cultural resource properties. Of the twelve cultural resource properties, ten properties lie at least partially on Forest Service lands while the remaining two are on private property. Only one of the twelve is eligible for the NRHP (National Registry) and four other properties were determined to be contributing elements. The one eligible property inventoried is the original Pipe Creek

[9] Personal communication between Robert Ray, Non-point Source Program Manager, MDEQ and Lani Eggertsen-Goff, PB, September 26, 2007.

Mainline logging road which is only located in a few places since most of the original road was eliminated with the construction of new roads and developments. The study also did not cover the area of Pipe Creek between RP 14 (Loon Lake Road) to RP 20.1 (Turner Mountain Road), which is now part of this current corridor study. Although the northern portion of the corridor was not part of the January 2004 report, a general search of the NRIS database was conducted as part of this corridor study and coordination with the appropriate agencies occurred. No specific sites within the northern portion of the corridor study area were identified. An updated cultural resources survey would need to extend from RP 6.1 (Bobtail Cutoff Road), or the chosen southern terminus of a future proposed project, to RP 20.1 (Turner Mountain Road).

As a NEPA/MEPA requirement, a cultural resources survey will need to be performed with any proposed project along Hwy 567. The area has a number of historic and prehistoric sites. According to the Forest Service, the area is a high priority zone for prehistoric sites. Due to agreements with the Tribes, the area is of special interest to the Confederated Salish and Kootenai Tribes (CSKT). Informal tribal consultation has occurred as part of this study, however, formal consultation with the Tribes would be needed as part of any project along Pipe Creek even though the area is outside of the CSKT reservation.

4.9 General Vegetation

Pipe Creek Road in the study corridor traverses heavily timbered forest land over much of its length. A variety of coniferous forest habitat types are represented in the corridor, with slope, aspect, elevation, proximity to water, and disturbance regime being key variables affecting forest composition. Lodgepole pine *(Pinus contorta)* and Douglas-fir (*Pseudotsuga menziesii*) forest types are common in the corridor, as are mixed species stands of western Larch *(Larix occidentalis)*, Douglas-fir, lodgepole pine, ponderosa pine *(Pinus ponderosa)*, grand fir (*Abies grandis*) and white pine (*Pinus monticola*). Other conifers in the corridor include western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), subalpine fir (*Abies lasiocarpa*), and Engelmann spruce *(Picea engelmannii)*.

Timber harvest in the corridor during the latter half of the previous century has had a significant impact on forest communities both immediately adjacent to the highway and throughout the Pipe Creek watershed. Today, the landscape is a mosaic of undisturbed mature forest and regeneration stands of varying ages and composition. Fire, both natural and prescribed, has also played a role in determining forest composition in the corridor over time.

Roadside ditches and cut slopes immediately adjacent to the roadway are generally well vegetated with such grass species as timothy *(Phleum pratense)*, smooth brome *(Bromus inermis)*, orchard grass *(Dactylis glomerata)*, and Kentucky bluegrass (*Poa pratensis*). The primary weedy species noted in disturbed roadside areas during the field reconnaissance include spotted knapweed (*Centaurea maculosa)*, and common tansy (*Tanacetum vulgare)*. Other common herbaceous and woody species noted in the corridor adjacent to the highway include: Oregon grape (*Berberis repens*), kinnikinik (*Arctostaphylos uva-ursi*), pine grass (*Calamagrostis rubescens*), thimbleberry (*Rubus parviflorus*), snowberry (*Symphoricarpos albus)*, serviceberry *(Amelanchier alnifolia)*, chokecherry (*Prunus virginiana*), ninebark (*Physocarpus malvaceus*), woods rose *(Rosa woodsii)*, and ceanothus (*Ceanothis velutinus*). Riparian and wetland species noted on site are discussed later in this memo, as are sensitive species known to occur in the corridor.

4.10 Wildlife

Of the 108 mammal species known for the state, 62 are suspected or known to occur in Lincoln County (Foresman 2001). Mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), elk (*Cervus elaphus*), moose (*Alces alces*), black bear (*Ursus americanus*), mountain lion (*Puma concolor*), American beaver (*Castor Canadensis*), porcupine (*Erethizon dorsatum*), striped skunk (*Mephitis mephitis*), long-tailed weasel (*Mustela frenata*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), deer mouse (*Peromyscus maniculatus*), bushy-tailed woodrat (*Neotoma cinerea*), red squirrel (*Tamiasciurus hudsonicus*), and meadow vole (*Microtus pennsylvanicus)* are common mammals occupying habitats in the general area and probably occur occasionally within the project corridor. White-tailed deer, moose, red squirrels and chipmunks (*Tamias sp.*) were all observed in habitats immediately adjacent to the roadway during the field reconnaissance, as well as black bear and elk

scat. Bushy-tailed woodrat activity was noted underneath the Pipe Creek Bridge just south of the entrance to Timberlane Campground.

4.10.1 Grizzly Bear

The corridor is also located in the designated "Grizzly Bear Habitat Distribution Area", which means the study area is located within known Grizzly Bear habitat. However, the study area is located just outside the designated "Cabinet-Yaak Grizzly Bear Recovery Zone". The Recovery Zone is a large area where Forest land management policies are required to facilitate the restoration of Grizzly Bears. The Recovery and Cabinet-Yaak Grizzly Bear Recovery Zones are illustrated on sheet 3 in Volume II. Grizzly Bear and Bull Trout are threatened species and are protected under Section 7 of the Endangered Species Act. Other protected wildlife in the corridor include the lynx, and wolf.

Due to recent litigation and the threatened listing of the Grizzly Bear, a primary concern in making improvements to the Pipe Creek corridor is the potential of having impacts to Grizzly Bears and habitat. The population of Grizzly Bears is declining in the Cabinet-Yaak ecosystem, which has been mostly caused by human indirect and direct impacts. Only 30-40 bears are estimated to remain in the entire Cabinet-Yaak ecosystem. In 2005 a female Grizzly Bear was shot in the Pipe Creek drainage, and a male Grizzly Bear was removed because of management concerns.

Grizzly Bears are threatened and are protected against "take" anywhere they occur. The legal definition of "take" is codified in Section 3 of the Endangered Species Act (ESA); "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Most of these terms are commonly understood. However, the terms "harm" and "harass" have been further defined by United States Fish and Wildlife Service (USFWS) regulations at 50 CFR S.17.3, as follows:

> "Harass means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm means an act which actually kills or injures wildlife. Such acts may include significant habitat modification or degradation when it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering."

A situation or proposal that may lead to a "take" is not always easy to define. Projects that increase traffic speed or traffic volumes on rural forest roads and that are located in Grizzly Bear territory are likely to cause concerns about possible adverse effects and "take" relative to grizzlies. Consultation with the USFWS will be necessary if it is determined that the proposed project will affect Grizzly Bears or other federally-listed species. If the proposed project is likely to result in adverse effects to listed species, USFWS will issue a biological opinion in which it is determined: 1) whether or not those adverse effects would be likely to jeopardize the continued existence of that species; 2) whether or not any critical habitat would be destroyed or adversely modified; 3) whether "take" of any listed species is anticipated from the project; and 4) what measures must be taken to minimize that amount of "take."

A court case relevant to this Corridor Study is the Revett Silver Company's Rock Creek Mine lawsuit. The 2003 Rock Creek Mine lawsuit involves land that is located in the Cabinet-Yaak ecosystem. The lawsuit focuses on impacts to bears and other protected fish and wildlife. The Court ruled that the population in the Cabinet-Yaak ecosystem is in peril and the USFWS was arbitrary or capricious in determining that the mine would not jeopardize Grizzly Bears or Bull Trout. The litigants argued that the indirect impacts associated with the mine and human activity will deleteriously impact the bear population, a bear population that can not sustain additional loss. The Court agreed and halted the project. In the meantime, the Rock Creek Mine has submitted an approximately $30 million mitigation package that includes enforcement, education, dedication of bear habitat conservation property, and other items. This could change the outcome of the lawsuit and it could be a potential example for future mitigation possibilities. MDT has explored the possibilities of participation in other agency or private party mitigation plans for credit, this was discussed during agency meetings and may be worth further exploration based on interests of MDT and other agencies.

With regards to the Grizzly Bear situation in Pipe Creek, research has shown that the upper areas of the Pipe Creek drainage are included within the home ranges for several Grizzly Bears and the lower areas in the drainage are not frequently visited by bears. The higher areas for home range are roughly from RP 17 and over to the Yaak. The lower areas are RP 17 and below to RP 6.1.

Improvement projects proposed on Pipe Creek Road that are identified for the areas higher in the drainage could have more impact on bears and result in greater likelihood for a "take" than improvement projects proposed in the lower areas of the Pipe Creek drainage. A full reconstruct and widening of Pipe Creek Road could result in a "take" of Grizzly Bears. On the other hand, a project simply proposing roadway striping on Pipe Creek Road is not likely to be a problem. Spot improvements, depending on the extent and location in the drainage, may be feasible without adverse effects to grizzlies. To receive the best input and direction from USFWS, the improvement options were recommended to be grouped together. The group of improvements will be evaluated with respect to the indirect and direct impacts to bears.

The USFWS will evaluate all the options advanced into projects and determine if Grizzly Bear "take" is likely to occur due to the project. Relevant factors could include, but are not limited to, traffic volumes, vehicle speed, and widening in areas that are sensitive to bears. The process is not black and white but rather would involve discretionary and professional judgment.

4.10.1.1General Conditions of Grizzly Bear

According to data obtained by USFWS, the Grizzly Bear population in the Cabinet-Yaak Mountains is at a high risk of extinction. For Grizzly Bears population size is the most powerful predictor of survivability. Grizzly populations less than 50-100 adults are at a high risk of extinction. The number of bears in the Cabinet-Yaak Mountains is between 30-40 bears. To minimize near term extinction, USFWS recommends adding additional 12 female bears to the Cabinet-Yaak Mountains between 2004 and 2010.

4.10.2 Bull Trout

Threatened Bull Trout reside throughout the Pipe Creek drainage, which provides spawning and rearing habitat for this species. Critical habitat for the Bull Trout was designated in the Pipe Creek drainage last year. Critical habitat designation only applies to private property in this drainage, as USFS and Plum Creek Timber Company properties are exempt from designation as critical habitat for Bull Trout. Approximately four miles of Pipe Creek along the project corridor has been designated as critical habitat. If a proposed project is determined to affect Bull Trout or its habitat, consultation with USFWS is required.

If the proposed project would likely result in adverse effects to listed species (including Bull Trout or Bull Trout critical habitat), then USFWS would issue a biological opinion. The East Fork of Pipe Creek was indicated as the most important tributary of the five or six other tributaries. It was also recommended that the number of stream crossings needs to be identified as part of the study.

4.10.3 Lynx

The Pipe Creek drainage is known habitat for threatened Canada Lynx. Lynx are rarely seen but are known to be in the area. Impacts to Lynx would need to be evaluated for any improvement proposal advanced into a project.

4.10.4 Wolf

The Cabinet-Yaak Mountains and Pipe Creek area are known habitat for endangered Gray Wolves. The wolf population is on the increase in the area. The Kootenai National Forest biologist indicated that a known wolf pack is currently in the Barron Creek and Blue Creek area which are near the Pipe Creek drainage area. Up to this year wolves have not been spotted in the Pipe Creek drainage but this year a dispersed female wolf has been seen to occupy the Pipe Creek drainage. It has been reported that this wolf may be moving with a male wolf. The dispersed female wolf was recently spotted between Shafer Creek and Noisy Creek in the Pipe Creek drainage. The wolves typically occupy a 250 square mile area. Wolves are spotted using radio collars and flight verification. Impacts to wolves have to be evaluated for projects to move forward.

4.10.5 Wildlife Habitat Linkage Zones

As part of the study, a wildlife habitat linkage analysis was conducted. The results of this study were compiled into a separate report which has been included in Appendix D. According to the study, wildlife habitat linkage zones are defined as:

> "The area between larger blocks of habitat where animals can live at certain seasons and where they can find the security they need to successfully move between these larger habitat blocks. Linkage zones are broad areas of seasonal habitat where animals can find food, shelter, and security".[10]

The results of the analysis indicted that there are three potential wildlife habitat linkage zones along Hwy 567. These zones are shown in Figure 6 and are generally described as follows:

- North of the Bobtail Cutoff Road (RP 8) to South of Blue Creek (RP11).
- North of Shafer Creek (RP 14.2) to south of the Seventeen Mile (RP 16.5) area.
- North of the Seventeen Mile development (RP 17.7) to the end of the study corridor (RP 20.1).

It should be noted that Hwy 567 north of the study corridor would likely be included as a potential wildlife linkage zone because of the large secure areas on either side of the road. The projected 2030 traffic volumes of 350 vehicles per day is far below the anticipated threshold of 4,000 vehicles per day identified as an impediment to wildlife movements. Research indicates that 2,000 to 3,000 vehicles per day may be problematic to wildlife habitat, contributing to habitat fragmentation and wildlife mortality, and 4,000 or greater vehicles per day may result in serious habitat fragmentation and wildlife mortality. Few additional human influence zones are anticipated in the future. The majority of private land holdings (except those of Plum Creek Timber Company) has been developed or is currently in the process of being developed.

4.11 Sensitive Species

Sensitive and rare plant and animal species are designated by the USFS, Bureau of Land Management (BLM), and Montana National Heritage Program (MTNHP) and are tracked by the MTNHP. Table 12 below lists fish and wildlife species currently included on the Kootenai National Forest sensitive species list which are known or suspected to occur within the study corridor. Those species on the Kootenai National Forest sensitive species list not known or suspected in the corridor are not included in the table.

Fifty sensitive plant species are currently listed on the Kootenai National Forest sensitive species list.[11] Of these, two species of moonwort, wavy moonwort (*Botrychium crenulatum*) and mountain moonwort (*Botrychium montanum*) are known from populations in the study corridor.[12] Of the 50 listed species, seven are known from the Pipe Creek drainage, while several others are suspected to occur there based on habitat availability.[13] A comprehensive list of plant species is not provided at this time, but all species would need to be evaluated in the future if MDT were to propose a project within the study corridor. While species designated as sensitive are not generally afforded the same protection as federally listed T&E species, extensive coordination with the USFS would be required to determine appropriate protective or mitigation measures should any sensitive plant populations fall within proposed construction limits. Site specific surveys for such plant species may be required.

[10] *Libby North Corridor Study: Preliminary Wildlife Habitat Linkage Analysis*; Post, Buckley, Schuh & Jernigan (PBS&J), pg 1, March 7, 2007

[11] U.S. Forest Service. 2002. *Draft Environmental Impact Statement, Pipestone Project. Kootenai National Forest, Libby Ranger District.* Lincoln County, Montana. May 2002

[12] Montana Natural Heritage Program. 2006. Data search for sensitive species occurrences in the vicinity of the Libby North Corridor Study project area. Helena, Montana

[13] Ibid.

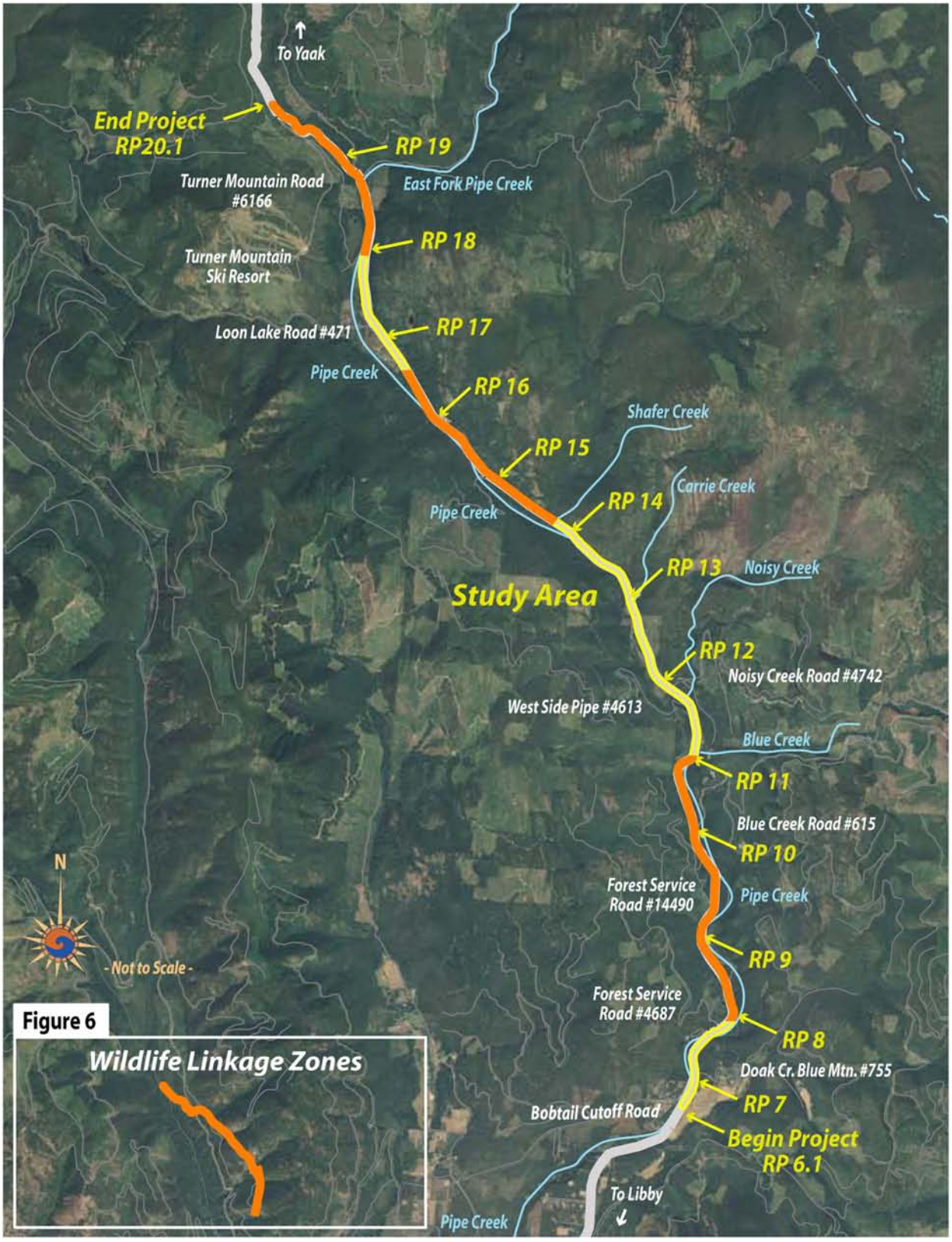
To Yaak
End Project
RP20.1
RP 19
Turner Mountain Road
#6166
East Fork Pipe Creek
RP 18
Turner Mountain
Ski Resort
RP 17
Loon Lake Road #471
Pipe Creek
RP 16
Shafer Creek
RP 15
Carrie Creek
RP 14
Pipe Creek
RP 13
Noisy Creek
Study Area
RP 12
Noisy Creek Road #4742
West Side Pipe #4613
Blue Creek
RP 11
Blue Creek Road #615
RP 10
Forest Service
Road #14490
Pipe Creek
RP 9
Forest Service
Road #4687
RP 8
Doak Cr. Blue Mtn. #755
RP 7
Bobtail Cutoff Road
Begin Project
RP 6.1
To Libby
Pipe Creek
N
- Not to Scale -
Figure 6
Wildlife Linkage Zones

Table 12 - Animal Species of Concern that may occur in the Libby North Corridor Study Area (not including T&E species)

Species	2006 MTNHP Ranking	Potential Habitat in the Study Area	Known Distribution in Project Area
Bald Eagle (*Haliaeetus leucocephalus)*	G5, S3 LT, PDL(out of date as of 10/07)	Potential nesting and roosting sites and likely feeding opportunities along Pipe Creek	No known active nest sites in Pipe Creek study area.
Peregrine Falcon (*Falco peregrinus*)	G4, S2B S (USFS) S (BLM)	No potential nest sites in study area. Possible feeding opportunities along Pipe Creek for migrating individuals	Species is not known from the Pipe Creek drainage. Likely occurs during migration along the Kootenai River corridor south of the study area and potentially along Pipe Creek during migration as well.
Flammulated Owl (*Otus flammeolus*)	G4, S3B S (USFS) S (BLM)	Mature ponderosa pine and Douglas-fir forest.	Species known from locations immediately south of the study area in the Sheldon Mountain vicinity[1].
Black-backed Woodpecker *Picoides arcticus*	G5, S2 S (USFS) S (BLM)	Early successional burned coniferous forest habitat.	Species known from the Pipe Creek drainage. Recent prescribed fire in the drainage continues to provide suitable habitat.
Townsend's big-eared bat *(Corynorhinus townsendii)*	G4, S2 S (USFS) S (BLM)	Occasional forager along forest edges and over wetland habitat associated with Pipe Creek. No known maternity colonies or hibernacula within study corridor.	Species known from several locations on the Kootenai National Forest. Species is suspected to occur within the analysis area.
fisher *Martes pennanti*	G5, S3 S (USFS) S (BLM)	Possible resident or transient along Pipe Creek and associated dense riparian vegetation.	No records from immediate project area, but known on the Kootenai National Forest.
wolverine *Gulo gulo luscus*	G4T4, S3 S (USFS) S (BLM)	Generally restricted to boreal forests in western mountains in areas of sparse human habitation. Expected as transient in the immediate project area and resident in upslope areas; primarily in coniferous forest.	Two records from the Gold Hill area adjacent to the study corridor[1].
western toad *(Bufo boreas)*	G4, S2 S (USFS) S (BLM)	Shallow backwater and riparian areas of Pipe Creek.	Species documented on Kootenai National Forest
Coeur d'Alene Salamander (*Plethodon idahoensis*)	G4, S2 S (USFS) S (BLM)	Springs and seeps, waterfall spray zones, and stream edges	Species documented on Kootenai National Forest – not known from immediate study area.
torrent sculpin (*Cottus rhotheus)*	G5, S3 S (USFS)	Headwater streams in the Kootenai River drainage.	Documented in Pipe Creek
westslope cutthroat trout *(Oncorhynchus clarki lewisi)*	G4T3, S2 S (USFS) S (BLM)	Pipe Creek and perennial tributaries.	Documented in Pipe Creek

[1]USFS 2002

4.12 Aquatic Resources

All named streams within the study corridor were reviewed during the field reconnaissance and information for each was gleaned from available literature and other resources. The streams within the study area are illustrated on Sheet 3 of Volume II.

Section 303(d) of the federal Clean Water Act requires states to assess the condition of their waters to determine where water quality is impaired or threatened; the result of this assessment is reported on the state 303(d) list.

Neither Pipe Creek nor any of its tributaries in the study corridor are included on the current Montana State 303(d) list.[14]

4.12.1 Pipe Creek

A perennial tributary to the Kootenai River and Pipe Creek parallel Pipe Creek Road at varying distances over the entire length of the study corridor and crosses under the roadway in three locations. The southern most crossing is a bridge structure located just south of the entrance road to Timberlane Campground. The second crossing of Pipe Creek is a large open bottom arch pipe at approximately RP 11.8. The northern most crossing in the study corridor is a newly constructed culvert near RP 18.9.

Pipe Creek is a typical cold mountain stream with low sinuosity and a cobble/gravel substrate. Over much of its length, Pipe Creek supports a narrow riparian wetland fringe along its banks that varies in width, but is rarely wider than twice the width of the stream channel.

Pipe Creek is considered a Core area (drainages containing the strongest remaining populations of Bull Trout in a restoration area) for Bull Trout in the Kootenai River drainage and the USFWS has also designated segments of Pipe Creek as critical habitat for this species. The Pipe Creek drainage is mainly comprised of the migratory life form of Bull Trout that occupy the Kootenai River as adults and then migrate upstream to spawn in Pipe Creek. Young Bull Trout may rear from one to several years in Pipe Creek before migrating downstream to the Kootenai where they spend a majority of their adult life.

Other fish species known to occur in Pipe Creek include brook trout (*Salvelinus fontinalis)*, rainbow trout (*Oncorhynchus mykiss)*, westslope cutthroat trout (*Oncorhynchus clarki lewisi)*, torrent sculpin (*Cottus rhotheus*), and longnose dace (*Rhinichthys cataractae*). Habitat conditions for all species have been impaired over time as a result of high levels of unstable substrates and fine sediment.[15]

4.12.2 East Fork Pipe Creek

A perennial tributary to Pipe Creek, East Fork Pipe creek crosses underneath the highway through a large open-bottom steel arch pipe near approximately RP 18.6. The confluence with Pipe Creek is just downstream from the roadway crossing. According to the Montana Fisheries Information System (MFISH), fish species known to occur in East Fork Pipe Creek include brook trout, rainbow trout, westslope cutthroat trout, and Bull Trout.[16]

4.12.3 Shafer Creek

A perennial tributary to Pipe Creek, Shafer Creek crosses underneath the highway through a large (approximately 10 foot) metal squash pipe near approximately RP 14.3. The confluence with Pipe Creek is several hundred feet downstream from the roadway crossing. Shafer Creek has a six to eight-foot wide channel, with mostly stable banks in the vicinity of the highway crossing and a gravel/cobble/small boulder substrate.

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[14] Montana Department of Environmental Quality (MTDEQ). 2006. *Draft 2006 Integrated 303(d) / 305 (b) Water Quality Report for Montana*. Helena, Montana.
[15] U.S. Forest Service. 2002. Draft Environmental Impact Statement, Pipestone Project. Kootenai National Forest, Libby Ranger District. Lincoln County, Montana. May 2002.
[16] Montana Fisheries Information System. 2006. Internet data search for fisheries information in the vicinity of the Libby North Corridor Study project area. Helena, Montana.

According to MFISH, fish species known to occur in Shafer Creek include rainbow trout and westslope cutthroat trout.[17] Bull Trout may also occur in the lower reaches of Shafer Creek during rearing.[18]

4.12.4 Carrie Creek

Carrie Creek as it is commonly referred to, is a perennial tributary to Pipe Creek that crosses underneath the highway through a small round metal culvert at approximately RP 12.9. Carrie Creek is the primary water source for a private seasonal cabin situated immediately downstream of the highway. Carrie Creek has a two to four-foot wide channel, with mostly stable banks in the vicinity of the highway crossing and a gravel/cobble/small boulder substrate. Westslope cutthroat are the only fish species known to occur in the lower reaches of this small creek.[19]

4.12.5 Noisy Creek and Blue Creek

Noisy and Blue creek are perennial tributaries to Pipe Creek that occur in the study corridor, but do not cross underneath the highway at this time. Both creeks are known to support westslope cutthroat trout and sculpin.[20]

4.13 Wetlands

As part of this existing conditions review of the study corridor, wetlands were observed and noted in the field; however, formal wetland delineation was not conducted at this time. Formal wetland delineation would be necessary for any proposed highway-related actions in the study corridor.

While the entire Pipe Creek drainage supports numerous small wetland potholes and lakes (i.e. Rainbow Lake, Loon Lake, Rice Lake, Tom Poole Lake), the only wetlands closely situated to the existing highway are fringe wetlands along Pipe Creek and its tributaries. Fringe wetlands adjacent to Pipe Creek vary in size from very narrow (1-2 feet wide) up to approximately twice the width of the creek (40-50 feet). Fringe wetlands associated with Shafer and Carrie Creek average three to five feet in width, while wetland habitat adjacent to the East Fork Pipe Creek averages10 to 15 feet in width near the highway.

Fringe wetlands in the corridor are typically about 90% scrub/shrub and 10% emergent habitats. Common wetland species noted adjacent to Pipe Creek and its tributaries include alder (*Alnus incana)*, red-osier dogwood *(Cornus stolonifera)*, and willow *(Salix sp.)* in the shrub layer and sedge (*Carex sp*.), horsetail (*Equisetum arvense*), and reed canary grass (*Phalaris arundinacea*) in the herbaceous layer.

Functional Assessment of study corridor wetlands was not performed at this time as wetlands were not delineated; however, with the presence of Bull Trout (threatened species) in the drainage and high wildlife values in the corridor, ratings would likely be moderate to high for many of the assessed functions.

5.0 Problems Identified in the Corridor

The following strategies were utilized to identify problems within the study corridor:

A. Review of existing MDT reports – Existing reports that MDT has prepared for the corridor were reviewed and include the following:
   - Preliminary Field Report dated January 21, 2003
   - MDT Accident Analysis Reports generated for the corridor from January 1, 1995 through March 31, 2006

   As the Preliminary Field Report and MDT Accident Analysis Reports were reviewed by PB, the analysis showed that accident trends within the corridor are higher than the statewide average for similar type routes. Also the overall trend is loss of control on curves, usually during snowy, slushy or icy roadway conditions. More than half of the accidents that occurred within the corridor occurred at night.

[17] Ibid.
[18] USFS, 2002.
[19] Ibid.
[20] Ibid.

B. Stakeholder interviews – A list of stakeholders to be interviewed was developed by MDT, Lincoln County, and the Forest Service. From this list thirteen project stakeholders were interviewed. A summary of the interviews is included in Section 8.

   During the stakeholder interviews safety and environmental concerns were discussed with resource agency staff, business owners, non-profit organizations and a local government official. The interview results are described in further detail in Section 8 and Appendix E.

C. Engineering review of the existing corridor compared to current design standards – The existing roadway alignment was compared to current standards and areas that do not meet current standards have been identified.

   The detailed review by the consultant's engineer identified all locations along the corridor that do not currently meet design standards. The issues identified included horizontal and vertical curves that do not meet standards, areas with sight distance (clear zone) deficiencies, side slopes that do not currently have adequate guard rail and/or shoulder. These problems are described in more detail below and are illustrated in Volume II Roadway Inventory Plans.

D. Public and Resource Agency coordination – Coordination with the general public and the resource agencies occurred throughout the study. Feedback from the public and agencies was used to identify corridor problems as well as potential solutions.

   Members of the general public and resource agency staff were invited to participate in meetings to discuss the Libby Corridor and identify concerns and interests related to the Corridor Study process. The description of the meetings that occurred during the study are described in Section 8 and Appendix E.

E. Geotechnical Study – A Preliminary Geotechnical Report was completed as part of this study (see Appendix B). Findings of this study have been included in this Corridor Study.

   Findings of the Preliminary Geotechnical Report have been included in this Corridor Study and the report is included in full as Appendix B. Slope stabilization and encroachment of the existing roadway on Pipe Creek are two of the key issues identified in the report.

F. Preliminary Biological Resources Investigation – A Preliminary Biological Resources Investigation was completed as part of this study to identify the biological resources near the corridor. Results of the investigation have been included in this Corridor Study.

   The Preliminary Biological Resources Investigation is included in full as Appendix C. Numerous species of wildlife and vegetation are described in the roadway corridor, as well as the aquatic resources and wetlands.

G. Preliminary Wildlife Habitat Linkage Analysis – A Preliminary Wildlife Habitat Linkage Analysis (see Appendix D) was completed as part of this study to identify the wildlife linkage zones near the corridor. Results of the investigation have been included in this Corridor Study.

   Three wildlife linkage areas were identified within the corridor but due to projected 2030 traffic volumes, traffic that may result from recommended roadway improvements are not anticipated to be an impediment to wildlife movements.

The following problems for Hwy 567 between RP 6.1 and RP 20.1 have been identified during this corridor study. Each of these problems is described in the paragraphs that follow. Specific locations of these problem areas are identified on the Roadway Inventory Plans (Volume II).

- Narrow roadway width throughout the corridor
- Lack of adequate signing and striping
- Substandard horizontal and vertical curvature
- Substandard side slopes (both cut and fill)
- Lack of or deteriorating guardrail
- Dense vegetation next to the roadway limits the ability of the sun to melt the snow and ice
- Rocks falling onto the road creating a hazard for motorists

5.1 Narrow and Inconsistent Roadway Width throughout the Corridor

The existing roadway has an average width of 20 feet. Current standards for this type of facility recommend a roadway width of 24 feet. This narrow roadway makes snow removal and storage difficult in the winter months and also does not allow much room if there is a stalled vehicle. It also poses a problem for routine maintenance activities. The inconsistent roadway width, the roadway varies in width from 15 feet to 26 feet, does not allow for consistent driver expectancy. For example, the changes in width along the roadway may cause the driver to feel the need to slow down as the road narrows. The lack of roadway shoulders is a direct result of the narrow roadway. If shoulders do exist, the widths do not meet safety standards.

5.2 Lack of Adequate Signing and Striping

The existing roadway does not have any paint striping and few signs where there are sharp curves or steep slopes. One of the public suggestions was to paint a centerline in the roadway to keep cars on the proper side of the road.

5.3 Substandard Horizontal and Vertical Curvature

Hwy 567 was originally built as a logging road and was not intended for public use. Many of the existing horizontal and vertical curves do not meet current design standards. The horizontal curve near RP 11 has been identified as a particular problem area because of the sharpness of the curve. Accident data indicates that this area has a higher frequency of accidents than other areas of the corridor.

5.4 Substandard Side Slopes (both cut and fill)

Much of the corridor has side slopes that are steep and do not meet current standards. This poses a safety issue for vehicles if they run off the road.

5.5 Lack of or deteriorating guardrail

In areas where side slopes can not be graded to meet current standards, shielding with guardrail should be considered. Much of the existing corridor does not have guardrail and in places where guardrail does exist in many cases it is in a poor condition. MDT is planning on replacing the existing guardrail between RP 10.8 and RP 11.2, it is anticipated this replacement will be completed in 2008.

5.6 Dense vegetation next to the roadway limiting the ability of the sun to melt the snow and ice

Highway 567 is located in the Kootenai National Forest and is surrounded by dense vegetation on both sides of the roadway. Tall trees located close to the edge of the road limit the amount of sunlight that hits the road, particularly in the winter. This lack of sunlight means that ice and snow take longer to melt. This is an issue all along the study corridor.

5.7 Rocks falling onto the road creating a hazard for motorists

There are locations along the corridor where rocks are falling onto the roadway. This creates a hazard for motorists, particularly because the road is narrow and driving around the rocks puts the motorist into the opposing lane of traffic.

6.0 Improvement Options

The alternatives development and screening process was intended to find the environmentally least damaging alternative while addressing the corridor problems. Several improvement options were developed to address the problems identified in the corridor.

During the alternatives development phase of the study five improvement options were created as described below. On May 8, 2007 an alternatives workshop was held in Libby, MT to review the alternatives (improvement options) developed and to discuss other possible options. Those who attended the workshop included representatives from MDT, FHWA, Lincoln County, Kootenai National Forest, USFWS, and PB. The workshop also included a site visit to the corridor.

During the workshop each of the improvement options was discussed in detail. The general consensus of the group was that a consistent top width, up to 24 feet should be built where possible. Snow storage should be addressed, and flattening the curves at RP 8 and RP 11 should be included. As a result of the workshop, Option 6 was created and is recommended for implementation in the corridor.

6.1 Improvement Option 1 – Full Reconstruction

Improvement Option 1 would reconstruct the roadway the entire 14 miles from RP 6.1 to RP 20.1 to current MDT Standard for a secondary rural collector road. A typical cross-section for this alternative is shown in Figure 7 and would include the following:

- Total reconstruction of the roadway
- Pavement top width of 28 feet
- Flattened side slopes to meet MDT current standards and anticipated traffic volumes as shown in Design Criteria table (Table 13) or install guardrail in areas where slopes can not be flattened without excessive impacts to the surrounding natural environment.
- Flattening of horizontal and vertical curves to meet MDT standards for 45 mph design speed as shown in Table 13.
- Centerline and shoulder striping
- Signing that meets current standards

Option 1 Advantages:

- Brings the roadway up to current MDT safety standards with regards to the functional classification.
- Corrects horizontal, vertical, and roadside deficiencies identified.
- Addresses safety concerns identified.
- Provides room for snow storage to address the problems identified by Lincoln County Maintenance.
- Help reduce accidents by meeting Driver expectation of a constant width roadway.

Option 1 Disadvantages:

- Expensive ($24.7 million in 2006 dollars, including Right of Way – see Appendix F for detailed estimate breakdown)
- Most impactive to the surrounding natural environment, including parts of the Grizzly Bear distribution area, Wildlife Linkage zones, and Pipe Creek of all the options (see Sheet 3 in the “Roadway Inventory” sheets in Volume 2 to see the portions of Hwy 567 Pipe Creek Road that are within the Grizzly Bear distribution area and Wildlife Linkage zones. See sheets RD-00 through RD-63 for the location of Pipe Creek in relation to Hwy 567 Pipe Creek Road).
- Does not fit with public perception regarding the nature of the road.
- This type of facility is not needed to handle the anticipated traffic volumes (overkill).
- Will require closing the road periodically during construction, closures will be temporary and coordinated with Lincoln County and the USFS.

Option 1 was not advanced because of cost, impacts to surrounding natural environment, and public input.

Table 13 - Design Criteria

Design Element			Design Criteria - AASHTO Green Book (1)	Design Criteria - MDT (2)	Design Criteria - AASHTO Low Volume Roads (3)	Design Criteria - Pipe Creek Road
Design Controls	Functional Classification		Rural Collector Road	Rural Collector Road	Rural Collector Road	Rural Collector Road
	Design Forecast Year		2030	2030	2030	2030
	Design Speed	Mountainous	45 mph (70km/h) pg. 420	45 mph (70km/h)	45 mph (70km/h)	45 mph (70km/h)
	Level of Service		B	B	B	B
Roadway Elements	Design Year Traffic	Current AADT	350	350	350	350
		DHV	44	44	44	44
	Roadway Width (Travel Lanes & Shoulders)		22 ft (6.6 m) pg. 425	28 ft (8.4 m)	20 ft (6.0 m) pg. 18	24 ft (7.2 m) 22ft (6.6 m) 20 ft (6.0 m) 4
	Cross Slope	Travel Lane	1.5% - 2% pg. 421	2%	N/A	2%
		Shoulder	1.5% - 2% pg. 421	2%	N/A	2%
	Median Width		N/A	N/A	N/A	N/A
Earth Cut Section	Inslope		4:1 (3:1 in cut) pg. 425	4:1 (6 ft - 2.0 m)	N/A	4:1 (6 ft - 2.0 m)
	Ditch	Width	N/A	10 ft (3.0 m) Figure 12-5 or 0 ft (0.0 m) Figure 11.7M	N/A	0 ft (0.0 m)
		Slope	N/A	20:1	N/A	20:1
	Back Slope; Cut Depth at Slope Stake	0'-5' (0-1.5m)	N/A	5:1	N/A	5:1
		5' - 10' (1.5m - 3.0m)	N/A	3:1	N/A	3:1
		10' - 15' (3.0m - 4.5m)	N/A	2:1	N/A	2:1
		15' - 20' (4.5m - 6.0m)	N/A	1.5:1	N/A	1.5:1
		> 20' (6.0m)	N/A	1.5:1	N/A	1.5:1
Earth Fill Slopes	Fill Height at Slope Stake	0'-10' (0-3.0)	N/A	4:1	N/A	4:1
		10' - 20' (3.0m - 6.0m)	N/A	3:1	N/A	3:1
		20' - 30' (6.0m - 9.0m)	N/A	3:1	N/A	3:1
		> 30'(9.0m)	N/A	2:1	N/A	2:1
Alignment Elements	DESIGN SPEED		45 mph (70km/h) pg. 420	45 mph (70km/h)	45 mph (70km/h)	45 mph (70km/h)
	Stopping Sight Distance		360 ft (105m) pg. 112	360 ft (105m)	300 ft (90m) pg. 34	360 ft (105m) desirable or 300 ft (90m) min [5]
	Passing Sight Distance		1625 ft (485m) pg. 124	1625 ft (490m)	N/A	1625 ft (490m)
	Minimum Radius (e=8.0%)		587 ft (168m) pg. 169 - 170	590 ft (175m)	465 ft (125m) pg. 27	590 ft (175m) desirable or 465 ft (125m) min [5]
	Superelevation Rate		emax = 8.0% pg. 424	emax = 8.0%	emax = 8.0%	emax = 8.0%
	Vertical Curvature (k-value)	Crest	61 (17 metric) pg. 422	61 (17 metric)	42 (13 metric) pg. 39	61 (17 metric) desirable or 42 (13 metric) min [5]
		Sag	79 (23 metric) pg. 422	79 (23 metric)	79 (23 metric) pg. 38	79 (23 metric)
	Maximum Grade	Mountainous	10% pg. 423	10%	N/A	10%
	Minimum Vertical Clearance		14 ft (4.3 m) pg. 427	16.5 ft (5.05m)	N/A	16.5 ft (5.05m)

(1) Refers to AASHTO's "A Policy on Geometric Design of Highway and Streets" 2004
(2) All Information listed here was taken from Figure 12-5 "Geometric Design Criteria for Rural Collector Roads Montana Department of Transportation Road Design Manual Chapter 12 except where otherwise noted.
(3) Refers to AASHTO's "Guidelines for Geometric Design of Very Low-Volume Roads (ADT<= 400) 2001
(4) See Figures 11 through 13 for Roadway Width Locations.
(5) This Lower Design Value may be used in areas of re-alignment to reduce impacts to surrounding natural environment. See Figure 10 for re-alignment locations.

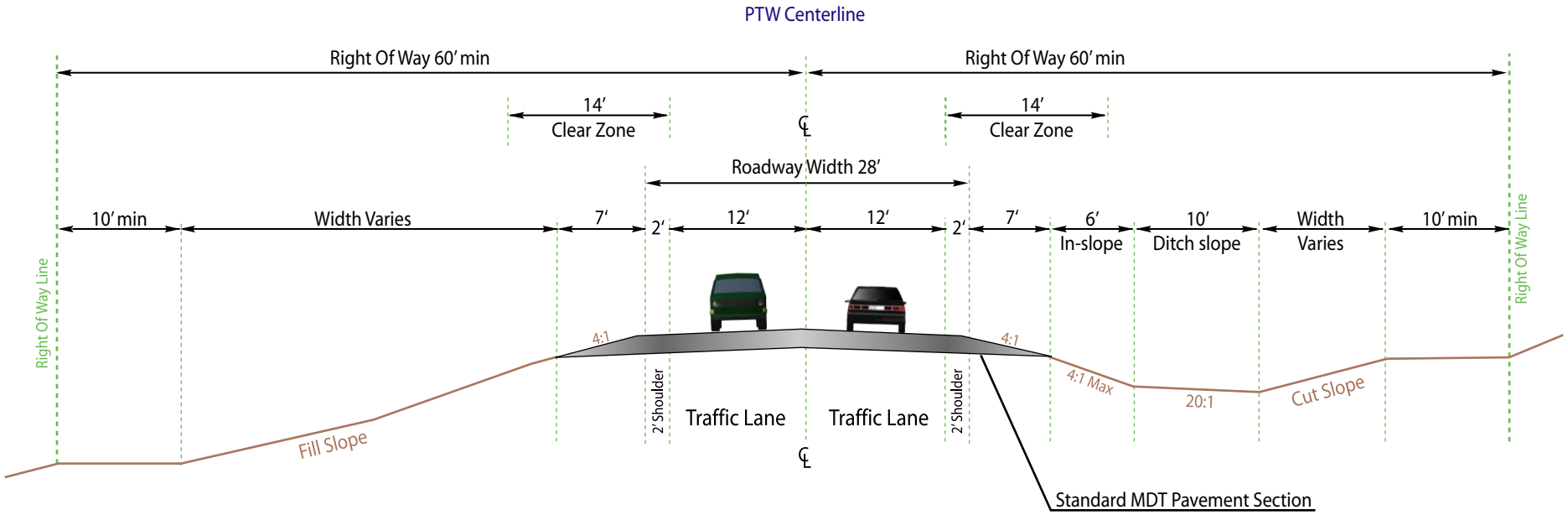


Figure 7

Improvement Option 1: Full Reconstruction Proposed Typical Cross-Section

6.2 Improvement Option 2 – Rehabilitation with minor widening to 24 feet

Improvement Option 2 would rehabilitate the existing roadway the entire 14 miles from RP 6.1 to RP 20.1. This option is shown in Figure 8 and would include the following:

- A 3.6" pavement overlay of the existing pavement.
- Minor widening of the existing pavement using the existing PTW to 24 feet total pavement width.
- Installing guardrail at selected locations (see Table 14 and Figure 9)
- Installing warning signs at selected locations (see Table 15)
- Flattened side slopes to meet current standards or guardrail in areas where slopes can not efficiently be flattened
- Pavement striping

Option 2 Advantages:

- Corrects roadside deficiencies identified.
- Less expensive than a full reconstruction ($10.3 million in 2006 dollars, which includes the cost of obtaining additional right-of-way at selected locations - see Appendix F for detailed estimate breakdown).
- Is in line with public perception regarding the nature of the road.
- Provides room for snow storage to address the problems identified by Lincoln County Maintenance.
- Can adequately handle anticipated traffic volumes.
- Help reduce accidents by meeting Driver expectation of a constant width roadway.

Option 2 Disadvantages:

- Does not address horizontal and vertical geometric deficiencies identified.
- Impacts the surrounding natural environment, including parts of the Grizzly Bear distribution area, Wildlife Linkage zones, and Pipe Creek (see sheet 3 in the "Roadway Inventory" sheets in Volume 2 to see the portions of Hwy 567 Pipe Creek Road that are within the Grizzly Bear distribution area, and Wildlife Linkage zones. See sheets RD-00 through RD-63 for the location of Pipe Creek in relation to Hwy 567 Pipe Creek Road).
- Will require closing the road periodically during construction, closures will be temporary and coordinated with Lincoln County and the USFS.

Option 2 was not advanced because it did not address the safety issues caused by the deficient geometry identified at RP 8 and RP 11.

6.3 Improvement Option 3 – Rehabilitation with no minor widening

Improvement Option 3 would rehabilitate the existing roadway the entire 14 miles from RP 6.1 to RP 20.1. This Improvement Option is shown in Figure 10 and would include the following:

- A 3.6" pavement overlay
- No widening of the existing pavement width
- Installing guardrail at selected locations (see Table 14 and Figure 9)
- Installing warning signs at selected locations (see Table 15)
- Flattened side slopes to meet current standards or guardrail in areas where slopes can not efficiently be flattened
- Pavement striping

Option 3 Advantages:

- Corrects roadside deficiencies identified.

- Less expensive than Options 1 or 2 ($5.7 million in 2006 dollars, which includes the cost of obtaining additional right-of-way at selected locations - see Appendix F for detailed estimate breakdown).
- Is in line with public perception regarding the nature of the road.
- Can adequately handle anticipated traffic volumes.
- Help reduce accidents by meeting Driver expectation of a constant width roadway.

Option 3 Disadvantages:

- Does not address horizontal and vertical geometric deficiencies identified.
- Impacts the surrounding natural environment, including parts of the Grizzly Bear distribution area, Wildlife Linkage zones, and Pipe Creek (see sheet 3 in the "Roadway Inventory" sheets in Volume 2 to see the portions of Hwy 567 Pipe Creek Road that are within the Grizzly Bear distribution area, and Wildlife Linkage zones. See sheets RD-00 through RD-63 for the location of Pipe Creek in relation to Hwy 567 Pipe Creek Road).
- Does not provide room for snow storage to address problems identified by Lincoln County Maintenance.
- Not feasible because some widening would need to be done to place the overlay.
- Will require closing the road periodically during construction, closures will be temporary and coordinated with Lincoln County and the USFS.

Option 3 was not advanced because it did not address the safety issues caused by the deficient geometry identified at RP 8 and RP 11, and it did not bring the existing pavement width up to MDT standards for this type of facility.

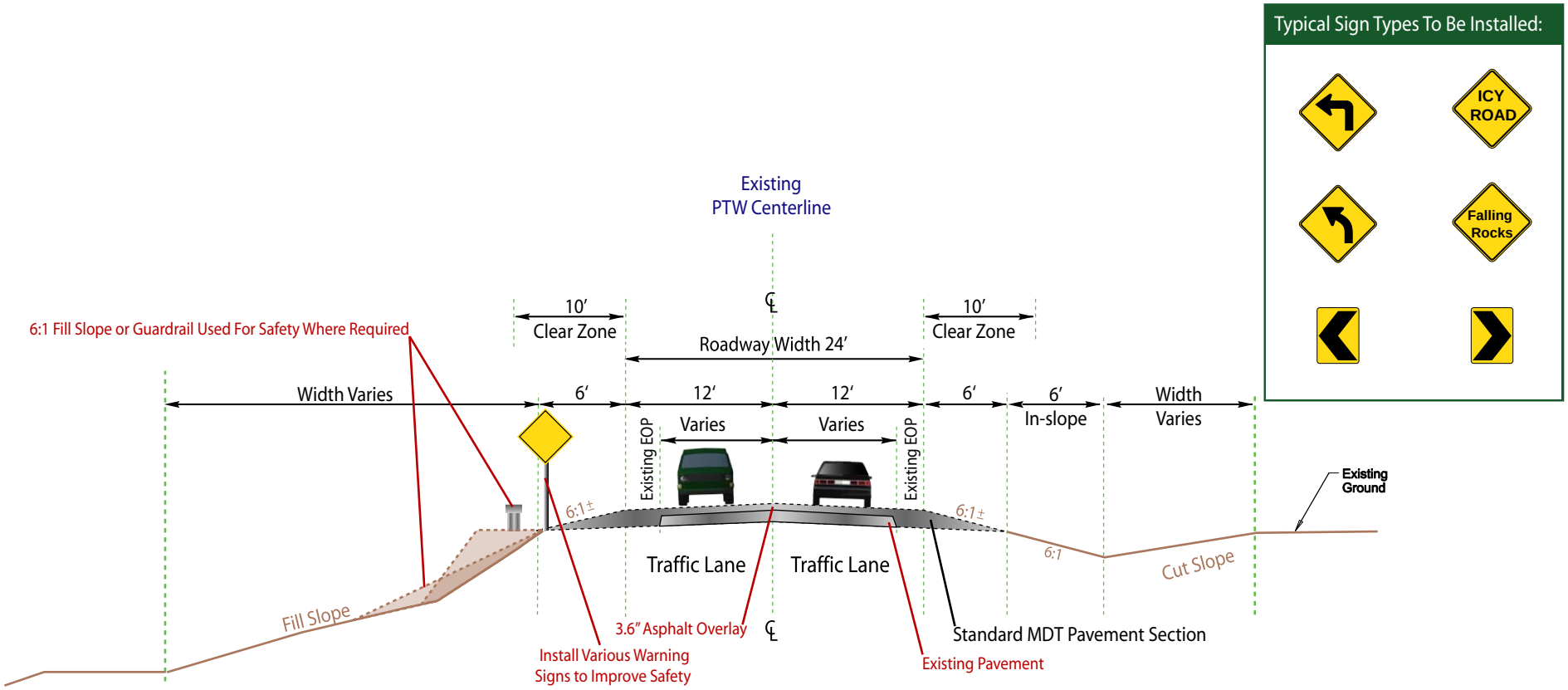
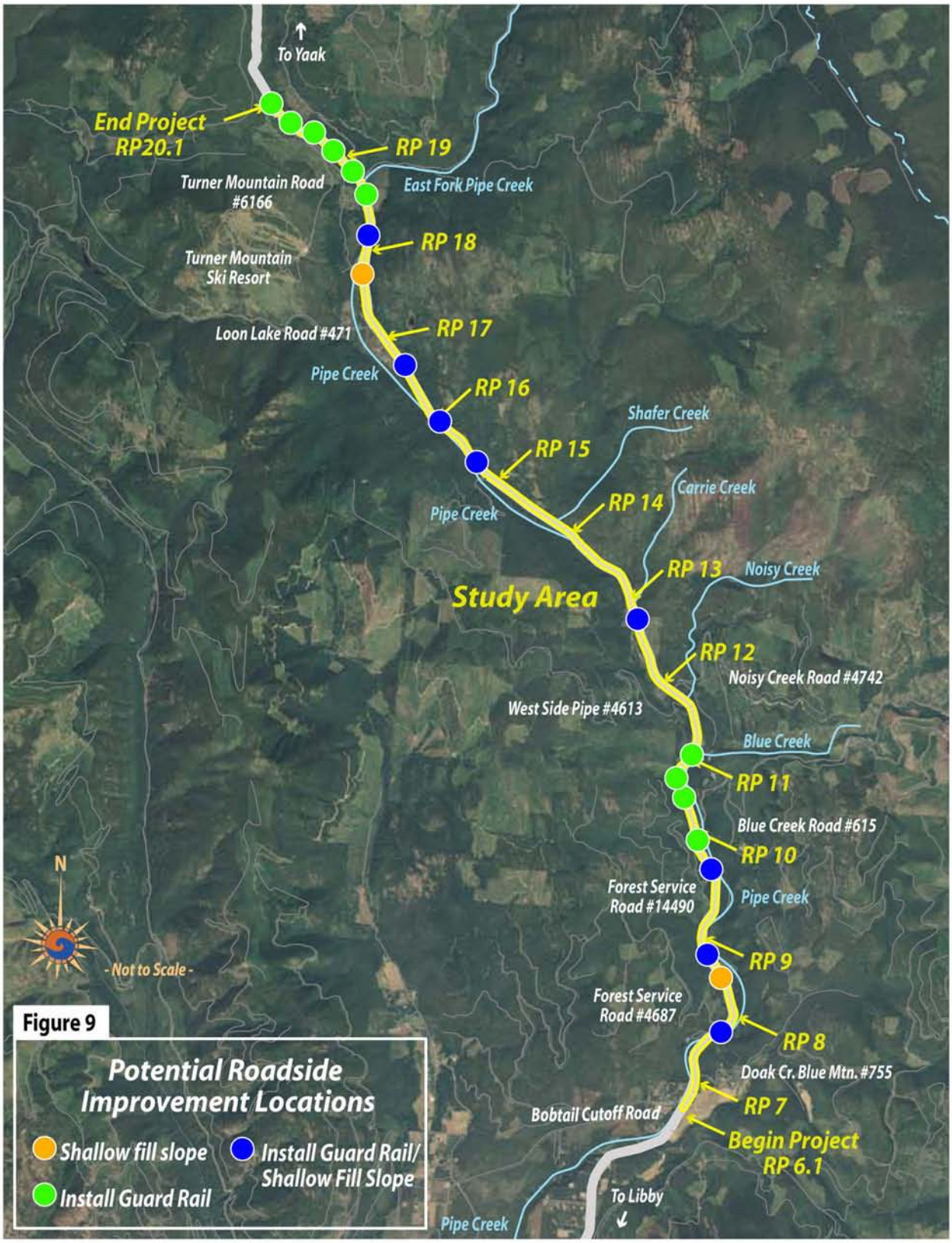


Figure 8

Improvement Option 2: 24' Widening Rehabilitation Proposed Typical Cross-Section


To Yaak
End Project
RP20.1
RP 19
Turner Mountain Road
#6166
East Fork Pipe Creek
RP 18
Turner Mountain
Ski Resort
RP 17
Loon Lake Road #471
Pipe Creek
RP 16
Shafer Creek
RP 15
Carrie Creek
RP 14
Pipe Creek
RP 13
Noisy Creek
Study Area
RP 12
Noisy Creek Road #4742
West Side Pipe #4613
Blue Creek
RP 11
Blue Creek Road #615
RP 10
Forest Service
Road #14490
Pipe Creek
RP 9
Forest Service
Road #4687
RP 8
Doak Cr. Blue Mtn. #755
RP 7
Bobtail Cutoff Road
Begin Project
RP 6.1
To Libby
Pipe Creek
N
- Not to Scale -
Figure 9
Potential Roadside
Improvement Locations
Shallow fill slope
Install Guard Rail/
Shallow Fill Slope
Install Guard Rail

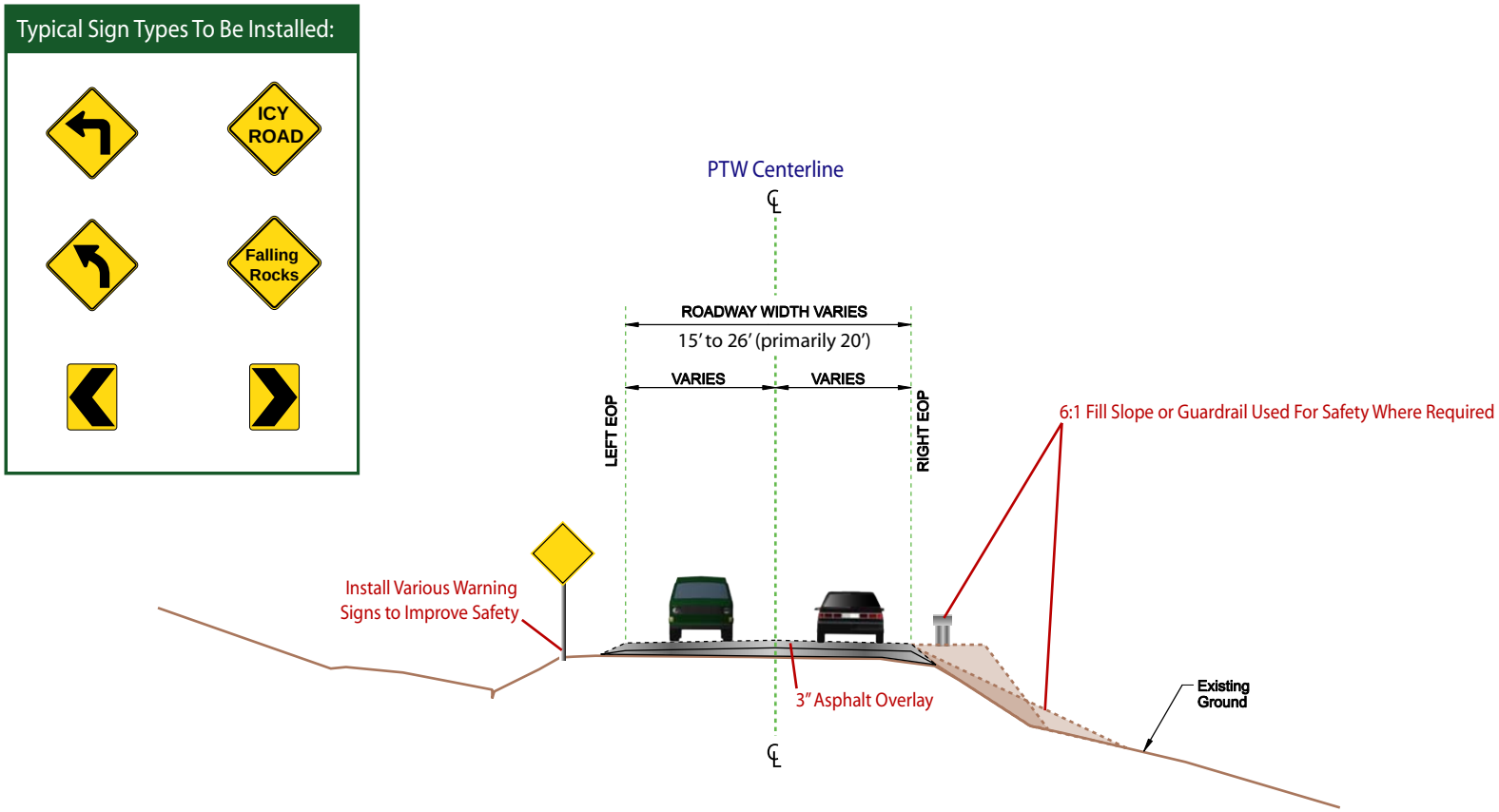


Figure 10

Improvement Option 3: Rehabilitation Proposed Typical Cross-Section

Table 14 - Locations for guardrail and slope modifications

Location	Side	Action Proposed
RP 7.8 – RP 8.0	Right	Shallow Fill Slope
RP 8.0 – RP 8.1	Right	Install Guardrail
RP 8.6 -0RP 8.7	Right	Shallow Fill Slope
RP 8.75 – RP 8.8	Right	Install Guardrail
RP 8.8 0 RP 8.9	Right	Shallow Fill Slope
RP 9.6 – RP 9.7	Right	Install Guardrail
RP 9.7 – RP 9.8	Right	Shallow Fill Slope
RP 9.9 – RP 9.99	Right	Install Guardrail
RP 10.5 – RP 10.6	Right	Install Guardrail
RP 10.7 – RP 10.8	Right	Install Guardrail
RP 12.6 – RP 12.7	Left	Shallow Fill Slope
RP 12.7 – RP 12.8	Left	Install Guardrail
RP 12.8 – RP 12.9	Left	Shallow Fill Slope
RP 15.3 – RP 15.5	Left	Install Guardrail
RP 15.5 – RP 15.52	Left	Shallow Fill Slope
RP 15.52 – RP 15.6	Left	Install Guardrail
RP 15.9 – RP 16.1	Left	Shallow Fill Slope
RP 16.1 – RP 16.2	Left	Install Guardrail
RP 16.6 – RP 16.7	Right	Shallow Fill Slope
RP 16.6 – RP 16.7	Left	Install Guardrail
PR 17.7 – RP 17.8	Left	Shallow Fill Slope
RP 18.0 – RP 18.1	Left	Shallow Fill Slope
RP 18.1 – RP 18.3	Left	Install Guardrail
RP 18.7 – RP 18.9	Left	Install Guardrail
RP 18.8 – RP 20.1	Right	Install Guardrail

Table 15 – Warning sign locations

Location	Side	Direction	Sign
RP 7.0	Right	North	Beware Falling Rocks
RP 7.1	Right	North	Icy Road
RP 7.8	Right	North	Turn Warning Sign (W1-1*) with 30 mph Speed Advisory
RP 8.0 +/-	Right	North & South	Series of Chevron Alignment Signs (W1-8)
RP 8.1	Left	South	Turn Warning Sign (W1-1) with 30 mph Speed Advisory
RP 9.6	Right	North	Curve Warning Sign (W1-2) with 30 mph Speed Advisory
RP 9.8	Left	South	Curve Warning Sign (W1-2) with 30 mph Speed Advisory
RP 9.8	Left	South	Curve Warning Sign (W1-2) with 30 mph Speed Advisory
RP 9.9	Right	North	Curve Warning Sign (W1-2) with 30 mph Speed Advisory
RP 10.1	Left	South	Curve Warning Sign (W1-2) with 30 mph Speed Advisory
RP 10.6	Right	North	Winding road Warning Sign (W1-5)
RP 10.8	Right	North	Curve Speed 25 mph Warning (W13-5)
RP 11.0 +/-	Right	North & South	Series of Chevron Alignment Signs (W1-8)
RP 11.1	Left	South	Curve Speed 25 mph Warning (W13-5)
RP 11.5	Left	South	Winding Road Warning Sign (w1-5)
RP 12.0	Left	South	Beware Falling Rocks
RP 15.9	Right	North	Curve Warning Sign (W1-2) with 35 mph Speed Advisory
RP 16.1	Left	South	Curve Warning Sign (W1-2) with 35 mph Speed Advisory
RP 18.7	Right	North	Winding Road Warning Sign (W1-5)
RP 18.8	Right	North	Speed Limit 25 mph (R2-1)
RP 20	Left	South	Speed Limit 25 mph (R2-1)
RP 20.1	Left	South	Winding Road Warning Sign (W1-5)
RP 20.5	Left	South	Icy Road
*All sign numbers refer to 2003 version of MUTCD			

6.4 Improvement Options 4 - Spot Improvements

Improvement Option 4, Figure 11, is the least expensive improvement option and also has the least impacts to the environment. The following elements are included as part of Improvement Option 4:

- Painted centerline stripe the entire 14 miles from RP 6.1 to RP 20.1
- Warning signs at locations identified in Table 15

Option 4 Advantages:

- Least expensive option ($187,501 in 2006 dollars - see Appendix F for detailed estimate breakdown).
- No additional Right of Way needed.
- Is in line with public perception regarding the nature of the road.
- Least impactive to the natural environment.
- Can adequately handle anticipated traffic volumes.
- Help reduce accidents by meeting Driver expectation of a constant width roadway.

Option 4 Disadvantages:

- Does not address horizontal and vertical geometric deficiencies identified.
- Does not correct roadside deficiencies identified.
- Does not provide room for snow storage to address the problems identified by Lincoln County Maintenance.
- Will require closing the road periodically during construction, closures will be temporary and coordinated with Lincoln County and the USFS.
-

Option 4 was not advanced because it did not address the safety issues caused by the deficient geometry identified at RP 8 and RP 11, and it did not bring the existing pavement width up to MDT standards for this type of facility.

6.5 Improvement Option 5 - Snow Storage Option

One of the issues identified as part of this corridor study was the lack of snow storage area in the winter. The "Roadway Inventory" sheets in Volume 2 identify the locations which are a problem. Because there is not enough room to store the snow on the existing roadway, the plowed snow piles next to the sides of the road basically making Hwy 567 a one-lane road in certain locations. To fix this problem would require cutting into the hillside and creating a widened area where maintenance crews can store the snow in the winter. Figure 12 shows a proposed typical cross section to create more snow storage area. Table 16 shows areas where snow storage has been a problem and also shows estimated earthwork volumes.

Option 5 Advantages:

- Second Least expensive option ($450,528 in 2006 dollars including Right of Way costs - see Appendix F for detail estimate breakdown).
- Is in line with public perception regarding the nature of the road.
- Can adequately handle anticipated traffic volumes.
- Provides room for snow storage to address the problems identified by Lincoln County Maintenance.
- Easy for maintenance to clean out snow storage areas with readily available equipment.

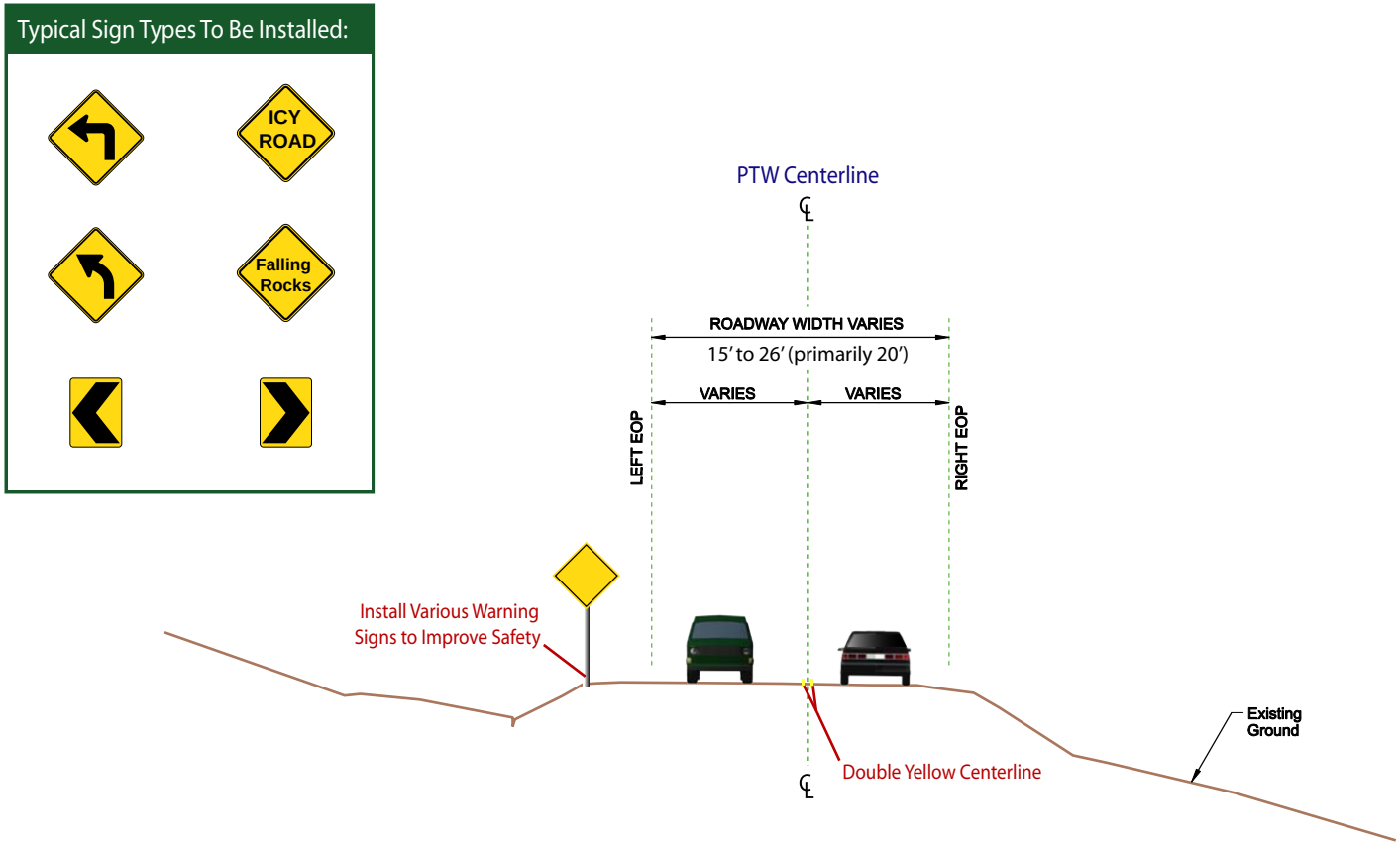


Figure 11

Improvement Option 4: Spot Improvements Proposed Typical Cross-Section

Option 5 Disadvantages:

- Does not address horizontal and vertical geometric deficiencies identified.
- Does not correct roadside deficiencies identified.
- Same anticipated impacts as Option 2 because of the cutting required to improve the snow storage, but without the safety improvements.
- Can easily be incorporated into previous options, for a better overall corridor product.
- Impacts the surrounding natural environment, including parts of the Grizzly Bear distribution area, Wildlife Linkage zones, and Pipe Creek (see sheet 3 in the "Roadway Inventory" sheets in Volume 2 to see the portions of Hwy 567 Pipe Creek Road that are within the Grizzly Bear distribution area, and Wildlife Linkage zones. See sheets RD-00 through RD-63 for the location of Pipe Creek in relation to Hwy 567 Pipe Creek Road).
- Construction activities will require occasional road closures, these will be temporary and coordinated with Lincoln County and the USFS.

Option 5 was not advanced because its objectives could be better achieved under a scenario that also addresses the inadequate pavement widths, and the substandard geometric components.

Table 16 - Snow Storage Widening Locations

Location	Side	Volume of Cut (yd3)
RP 10.9 – 11.1	Left	4100
RP 14.32 – RP 14.35	Right	900
RP 14.6 – 14.7	Right	900
RP 15.1 – RP 15.2	Right	400
RP 15.3 – RP 15.4	Right	650
RP 15.41 – RP 15.43	Right	1300
RP 15.46 – RP 15.54	Right	1725
RP 15.9 – RP 16.1	Right	2900
RP 16.15 – RP 16.17	Right	200
RP 16.7 – RP 16.8	Left & Right	500
RP 17.9 – RP 18.2	Right	5200
RP 18.32 – RP 18.36	Left & Right	620
RP 18.69 – RP 18.7	Right	150
RP 18.6 – RP 18.7	Right	250
RP 18.8 – RP 20.0	Left	5800
	TOTAL	25595